

10

SPARES AND ACCESSORIES

10. ACCESSORIES AND SPARES

CHAPTER	FIGURE	PAGE	ITEM No.	PART No.	DESCRIPTION
4	4.1	4.4	1	BEO0039	Laser ON Indicator (lamp)
				BEO0038	Laser ON Indicator Holder
			2	BFS0934	Rear Mirror Adjuster screws (Horiz.)
			3	"	Rear Mirror Adjuster screws (Vert.)
			4	SBZ0009	Umbilical Cable
4	4.2	4.5	5	BFS0934	Front Mirror Adjuster (Vert.)
			6	"	Front Mirror Adjuster (Horiz.)
			8	SAO0005	Beam Stop
			9	CMR0008	Foot Locking Nut
			10	CMM0012	Adjustable Foot
4	4.3	4.6		SEP0001	Clock Pulser Unit (CLP):
			11	(includes)	Frequency Meter
			12		Frequency Control
			13		Sync Out Socket
			14		INT/EXT Select Switch
			15		EXT Input Socket
				SEE0067	Auto-Sequence PCB:
			16	(includes)	OUT OF RANGE Indicator
			17		READY Indicator
			18		START Switch
			19		WARM UP Indicators
			20		FAULT Indicator
			21		STOP Switch
			22		HIGH VOLTAGE WARNING:
				BEO0055	Indicator (Lamp)
				BEO0035	Indicator Holder
4	4.4	4.8	23		POWER SUPPLY ON:
				BEO0037	Indicator (Lamp)
				BEO0013	Indicator Holder
			24	BES0068	KEY SWITCH
			25	BES0097	EMERGENCY STOP Button
			26	SBZ0009	Umbilical Cable
			27	BVV0003	Gas Supply Select Switch
			28	BVA0043	External Gas Port
			29	BEG0025	External Interlock

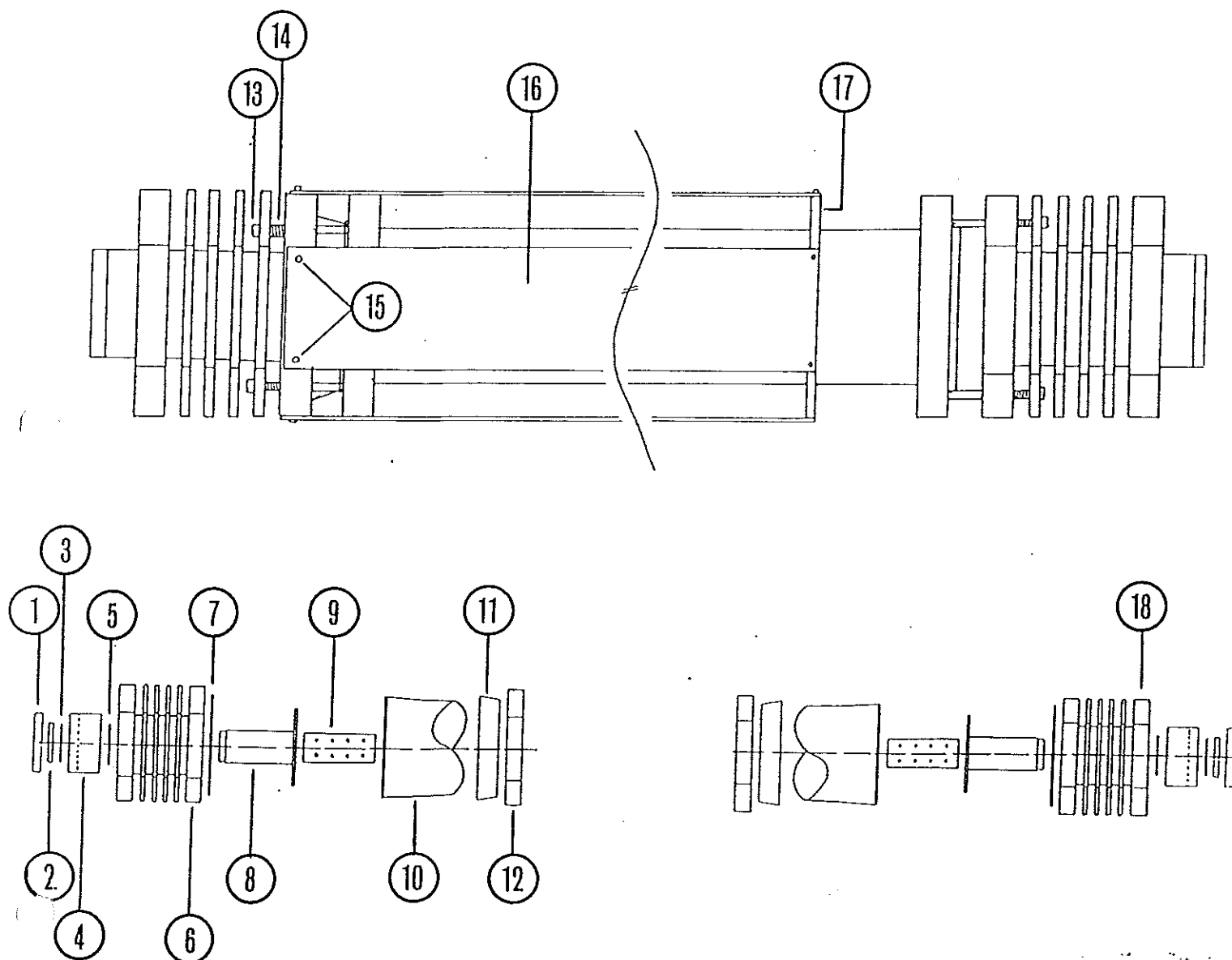
CHAPTER	FIGURE	PAGE	ITEM No.	PART No.	DESCRIPTION
4	4.4	4.8	30	BEF0017 BEF0020	POWER SUPPLY FUSE; Fuse; 15A Quick blow Fuse Holder
			31	BED0008	Power Supply Cable
			32	BEF0021	HV Power Circuit Breaker
			33	BEG0862	External Readout Meter Connection
5	5.1	5.10	1	BVV0036	Gas In Regulating/Shut- off Valve
			2	"	Gas Out Regulating/Shut- off Valve
5	5.2	5.10	1	BES0102	FAST GAS IN Override Switch
			2	"	FAST GAS OUT Override Switch
6	6.1	6.2	1	See Fig. 9.9	Indicator(s) (Lamp)
			2	"	Override Switch(es)
9	9.1	9.17	1	See Fig. 4.4 (includes)	UMBILICAL CABLE:
			2		Gas In Port (1/4 inch Swagelok)
			3		Gas Inlet Selector
			4		Single Phase Power Supply Cable
			5		Power Supply (Mains) Fuse
			6		HT Circuit Breaker
			7		External Interlock Connection
			9		External Meter Socket
9	9.2	9.18	1	SAL0002 SAL0007	LASER OVF ASSEMBLY: CU10-A CU15-A
			2	CMR0045	HV End Flange
			3	CMR0046	Earth End Flange
			4	BOW0002	Output Coupler (Spec. B Optic)
			5	COP0002	Reflective 100% Mirror
			6	BEC0074	Peaking Capacitor
			7	SAE0001	Charging Inductor
			8		LASER HEAD GAS HANDLING SYSTEM (COMPLETE):
				SAG0005	CU10-A
				SAG0004	CU15-A

CHAPTER	FIGURE	PAGE	ITEM No.	PART No.	DESCRIPTION
9	9.3	9.19	1		RESONANT CHARGING CIRCUIT:
				SEZ0005	Inductor
				SEE0002	Diode
			2	SBT0007	Thyratron Tank
			3	SEP0007	HV Trigger Unit
			4	BES0072	Oil Temperature Switches
			5	BEC0075	Smoothing Capacitors
			6		S M O O T H I N G INDUCTORS:
				BET0045	L1 (Bottom)
				BET0046	L2 (Top)
				SBH0003	L3 Anti-trip inductor
			7	BEM0051	TC 160
			8	BEU0066	Thyristor Unit
			9	BEQ0017	Dump Switch
				BER0143	1K Resistor
			10	BET0041	HV Transformer
			11	BEF0021	HV Circuit Breakers
			12	BEU0052	HV Rectifiers
					RC SUPPRESSOR PCB:
				BEC0146	Capacitors
				BER0160	Resistors
9	9.4	9.20	1	See Figs 5.1 & 5.2	Gas manifold, Valves & Switches
			2	CEC0058	Power Controller Unit
				SEE0133	Condition Timer
			3	BVP0010	Vacuum Pump
			4	SEE0069	Motherboard PCB
					Interlock Override PCB
			5	BEB0001	Battery For Fans
			6	BEJ0001	Power Supply (Mains) Filter
			7	BMF0002	Oil Mist Filter
			8	BET0047	PSU Low Voltage Transformer
9	9.5	9.21	9	SEP0001	PRF Unit (CLP Unit)
			10	CMB0003	Gas Cylinder Retaining Brackets
			1	CMR0046	Earth End Flange
			2	BVM0011	Pressure Gauge
			3	BVA0043	External Gauge Port
			4	BVV0037	Fast Pump-Out Solenoid Valve
			5	"	Slow Pump-Out Solenoid Valve
			6	BEG0175	Power Connector for Solenoid Valves
			7	RNT0001	Gas In Line
			8	RNT0003	Gas Out Line
			9	BEI0001	24V Intake Fan

CHAPTER	FIGURE	PAGE	ITEM No.	PART No.	DESCRIPTION
9	9.5	9.21	10	BEI0004	240V Exhaust Fan
			11	SAC0004	Output Coupler Mount
			12	BES0064	Laser Head Interlock Switch
9	9.6	9.22	1	BES0064	Laser Head Interlock Switch
			2	SAE0001	Pulsed Circuit Charging Inductor & Gas Inlet
			3	SAG0006	Gas Input Restrictor
			4	BED0153	Pulsed HT Connection
			5	BEC0074	Peaking Capacitor
			6	BEI0001	24V Intake Fan
			7	BEI0004	240V Exhaust Fan
			8	CMR0045	HT End Flange
			9	BED0153	Earth Connect & Return
			10	BEO0038	HT On Indicator
			11	SAC0003	Rear Mirror Mount
			12	BEG0297	12-pin Power-In "Bulgin" Connector
9	9.7	9.23	1	BVV0036	Gas Out Regulating and Shut-off Valve
			2	"	Gas In Regulating and Shut-off Valve
			3	BES0102	Gas Out Fast Pump Override Switch
			4	"	Gas In Fast Pump Override Switch
			5	BGR0002	Pressure Input Regulator
			6	BVM0008	Vacuum Interlock Switch
			7	RNT0001	Vacuum Pump Line
			8	BVM0004	Pressure Interlock Switch
			9	BVV0039	Solenoid Valve
9	9.8	9.24	7	BES0103	Voltage Select
			8	BEW0001	HT On Timer
9	9.9	9.25		SEE0023	THYRATRON CONTROL MODULE:
			1	(Includes)	Thyratron Delay Override Switch
			2		Anti-Trip Counter
			3	SEE0012	Interlock Override Module
			4	SEE0010	Low Voltage Power Supply Module
			5	SEE0013	Emergency Fan Override (Fan Drive Module)

CHAPTER	FIGURE	PAGE	ITEM No.	PART No.	DESCRIPTION
9	9.10	9.26	1	SBT0005 Kit	CAPACITOR BANK (COMPLETE); Standard Frequency Configuration Low Frequency Configuration
			2	BED0153	DC Input (Cable)
			4	BEG0028	+ve Trigger Input (BNC)
				SBJ0013	" " " Cable
			5	BEG0028	-ve Trigger Input (BNC)
				SBJ0013	" " " Cable
9	9.11	9.27	1	BER0140	-ve & +ve Grid Bias Resistors
				BES0001 (includes)	Thyratron CX1535;
			3		Thyratron Heater Wires
			4		Thyratron Retaining Screw
			5		Thyratron Anode Heatsink & Braid
9	9.12	9.28	1	CEC0058	Power Controller PCB
			2	BEJ0001	Filtered Power Supply Input
			3	BEF0020	Power supply Input Fuse
			4	See Fig. 1	Signal Input/Output Cables
			5	BER0127	Power Input Trimpot
9	9.13	9.29	1	BEM0051	TC 160 Thyristor Controller
			2	BEU0066	Thyristor Unit
			3	SEE0068	Snubber PCB
			4	SEE0096	HV Sense PCB
10	10.1	10.8	1	COR0001	Off axis window retaining ring
			2	BOW0002	2" Spec. B optic
			3	BVO0002	"O" ring (Viton - 408.7mm x 3.53mm)
			4	COM0001	Off axis window mount
			5	BVO0003	"O" ring (Viton - 473.7mm x 1.78mm)
			6	CMR0046	Earth end flange
			7	BVO0004	"O" ring (Viton - 113.67mm x 6.99mm)
			8	SAM0001	Electrode carrier
			9	CEE0001	Electrode
			10	SAL0002	QVF Assembly; CU 10-A
				SAL0007	QVF Assembly; CU 15-A
			11	BQQ0001	Graphite collar
			12	CMR0006	Earth end retaining collar
			13	BFS0355	Socket cap screw; M5x70mm
			14	BMZ0057	Compression spring
			15	BFS0110	Socket cap screws; M4x10MM

CHAPTER	FIGURE	PAGE	ITEM No.	PART No.	DESCRIPTION
10	10.1	10.8	16	CMR0005	Earth end flange retaining collar
			17	CMP0006 CMP0035	EARTH RETURN PLATE: CU10-A CU15-A
			18	CMR0045	HT end flange



1. Off axis window retaining ring
2. 2" Spec. B optic
3. "O" ring (Viton - 40.87mm x 3.53mm)
4. Off axis window mount
5. "O" ring (Viton - 47.37mm x 1.78mm)
6. Earth end flange
7. "O" ring (Viton - 113.67mm x 6.99mm)
8. Electrode Carrier
9. Electrode

10. QVF Assembly
11. Graphite Collar
12. Earth end retaining collar
13. Socket cap M5 x 70mm screw
14. Compression spring
15. Socket cap M4 x 10mm screws
16. Earth end retaining collar
17. Earth end return plate
18. HT end flange

Figure 10.1 Compact laser head assembly

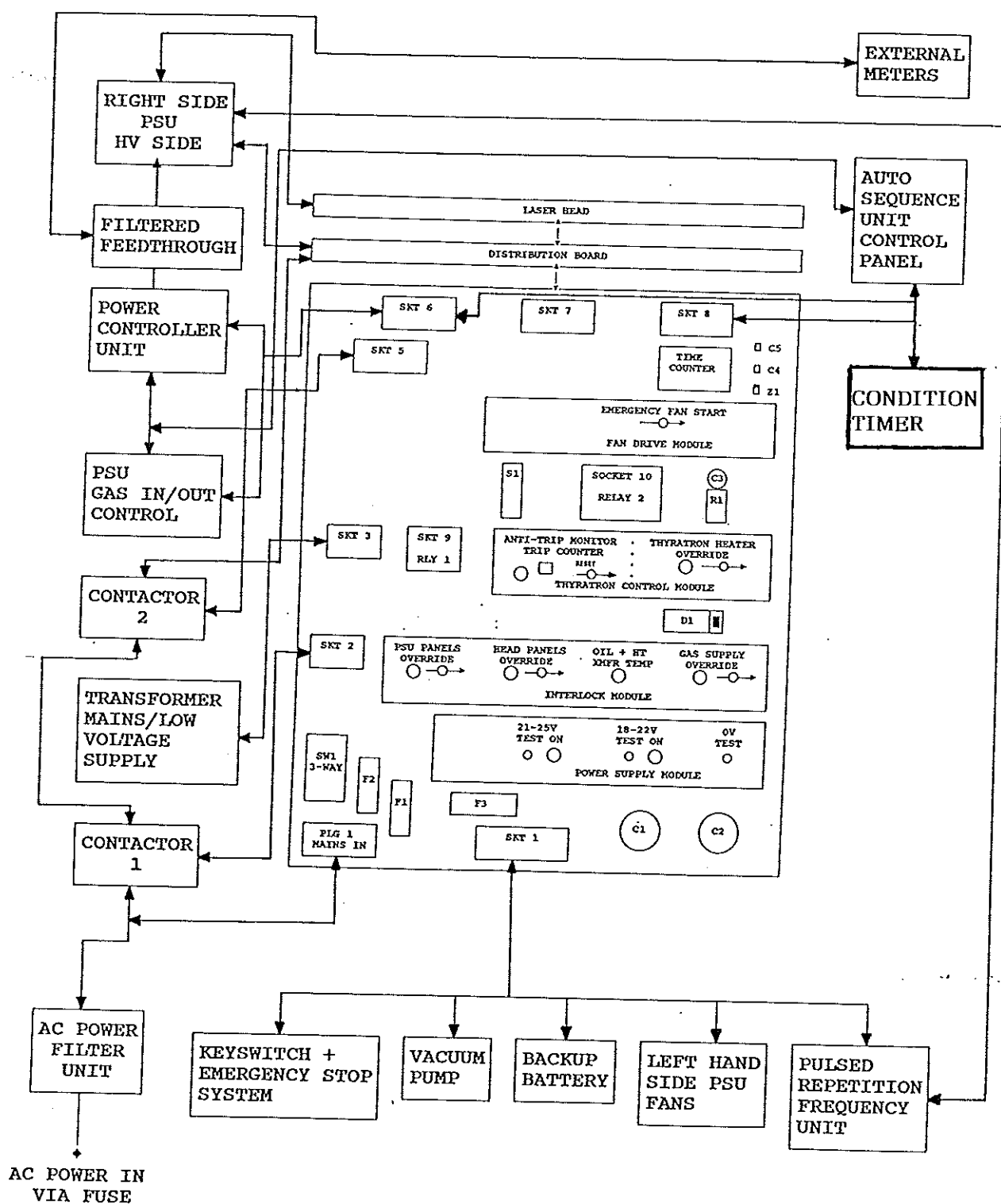


Figure 10.2 Compact laser schematic block wiring diagram

EXTENDED FREQUENCY OPTION
COMPACT LASER
CU15A AND CU10A

EXTENDED FREQUENCY OPTION FOR COMPACT LASERS

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2	INSTALLATION	3

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Table 2	Extended frequency option for CU15A	5

EXTENDED FREQUENCY OPTION FOR COMPACT LASERS

1 DESCRIPTION

The standard CU10A AND CU15A air cooled copper vapour laser are optimised to run at pulse repetition frequencies (PRFs) of 10 kHz.

The extended frequency option for both models consists of an additional set of capacitors which are mounted on an additional bracket, enabling the laser output to be optimised over a range of PRFs from 2-20 kHz for the CU10A, and 3-20 kHz for the CU15A. It also includes a single 0.5nF capacitor which is to be used when the laser is operated at very high pulse repetition frequencies (above 20kHz) in burst mode.

The values of thyatron tank capacitance are configured to optimise the laser output at each frequency as shown in Tables 1 and 2.

2 INSTALLATION OF PSU CAPACITORS

Note: Before beginning the installation read these notes carefully. Switch off the laser and isolate from the main power supply.

- 1) Detach the top panel and safety panel of the PSU by removing the M4 CSK screws using a Phillips screwdriver.
- 2) As a safety precaution, discharge the capacitors to earth by using a long-bladed tool (with an insulated handle) to connect between the edge of the PSU and each capacitor bracket in turn.
- 3) Refer to appropriate table to find the total capacitance value for the required PRF.

Note: Capacitors must at all times be handled with care.

- 4) Loosen the retaining nuts on both the DC HT and pulsed HT (see Figure 1 for location).
- 5) If the capacitance value for the desired PRF is greater than 3 nF, remove all six (6) 8/32 UNC nuts, washers, and the standard capacitors, (if the capacitance value is less than 3 nF, just remove the capacitors that are not required).
- 6) Fit the brackets and the required number of capacitors as shown in Figure 2.
- 7) Tighten the retaining nuts, taking care to ensure a good contact but not over tightening.
- 8) Replace safety panel followed by top panel.

INSTALLATION OF HEAD CAPACITOR

- 1) Take off the head cover by removing the M4 CSK screws using a Phillips screwdriver.
- 2) As a safety precaution discharge the head capacitor to earth (as in 2) above).
- 3) Loosen the retaining nuts on the head capacitor.
- 4) Slide out the head capacitor from the bracket.
- 5) Install the new capacitor and tighten the nuts.
- 6) Relace the head cover.

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Table 1 Extended frequency option for CU10A

PULSE REPETITION RATE (PRF)	CAPACITANCE VALUE IN TANK (nF)	CAPACITANCE VALUE IN HEAD (nF)
2	10 (5 x 2 nF)	1 (1 x 1 nF)
3	10 (5 x 2 nF)	1 (1 x 1 nF)
4	8 (4 x 2 nF)	1 (1 x 1 nF)
5	6 (3 x 2 nF)	1 (1 x 1 nF)
6	6 (3 x 2 nF)	1 (1 x 1 nF)
7	4 (2 x 2 nF)	1 (1 x 1 nF)
8	4 (2 x 2 nF)	1 (1 x 1 nF)
9	3 (3 x 1 nF)	1 (1 x 1 nF)
10	3 (3 x 1 nF)	1 (1 x 1 nF)
12	3 (3 x 1 nF)	1 (1 x 1 nF)
14	2 (2 x 1 nF)	1 (1 x 1 nF)
16	2 (2 x 1 nF)	1 (1 x 1 nF)
18	2 (2 x 1 nF)	1 (1 x 1 nF)
20	2 (2 x 1 nF)	1 (1 x 1 nF)

Note: For operation in burst mode at frequencies above 20kHz we recommend that the laser is set up as follows:

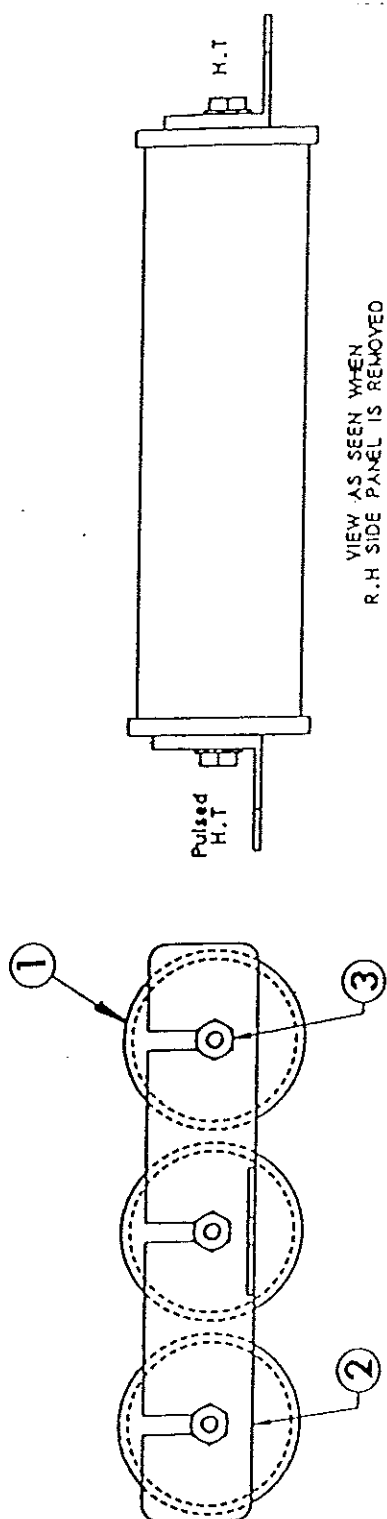
Burst 20-30kHz	2 (2 x 1 nF)	0.5 (1 x 0.5 nF)
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Table 2 Extended frequency option for CU15A

PULSE REPETITION RATE (PRF)	CAPACITANCE VALUE IN TANK (nF)	CAPACITANCE VALUE IN HEAD (nF)
3	10 (5 x 2 nF)	1 (1 x 1 nF)
4	8 (4 x 2 nF)	1 (1 x 1 nF)
5	6 (3 x 2 nF)	1 (1 x 1 nF)
6	6 (3 x 2 nF)	1 (1 x 1 nF)
7	4 (2 x 2 nF)	1 (1 x 1 nF)
8	4 (2 x 2 nF)	1 (1 x 1 nF)
9	3 (3 x 1 nF)	1 (1 x 1 nF)
10	3 (3 x 1 nF)	1 (1 x 1 nF)
12	3 (3 x 1 nF)	1 (1 x 1 nF)
14	2 (2 x 1 nF)	1 (1 x 1 nF)
16	2 (2 x 1 nF)	1 (1 x 1 nF)
18	2 (2 x 1 nF)	1 (1 x 1 nF)
20	2 (2 x 1 nF)	1 (1 x 1 nF)

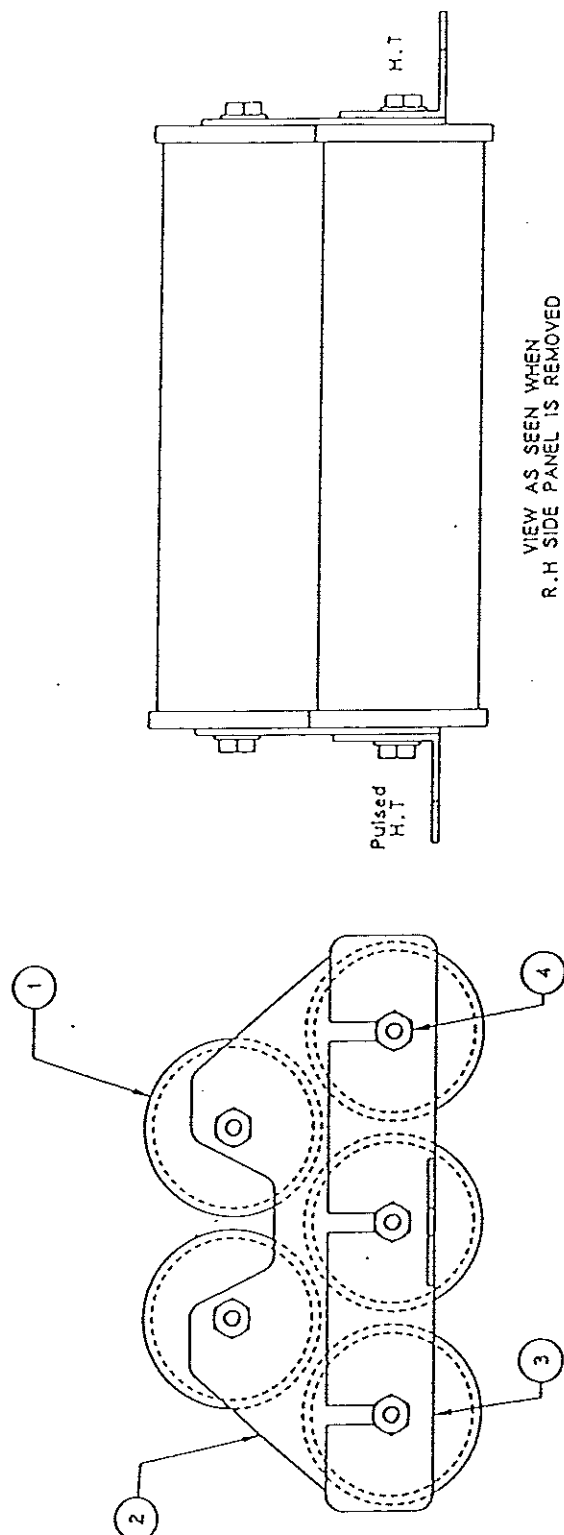
Note: For operation in burst mode at frequencies above 20kHz we recommend that the laser is set up as follows:

Burst 20-30kHz	2 (2 x 1 nF)	0.5 (1 x 0.5 nF)
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- KEY:
- 1 - CAPACITOR
 - 2 - STANDARD FREQUENCY BRACKET
 - 3 - 8/32 UNC NUT

Figure 1 Capacitor bracket standard configuration



- KEY:
- 1 - CAPACITOR
 - 2 - OPTION FREQUENCY BRACKET
 - 3 - EXISTING MOUNTING BRACKET
 - 4 - 8/32 UNC NUT

Figure 2 Capacitor bracket extended configuration